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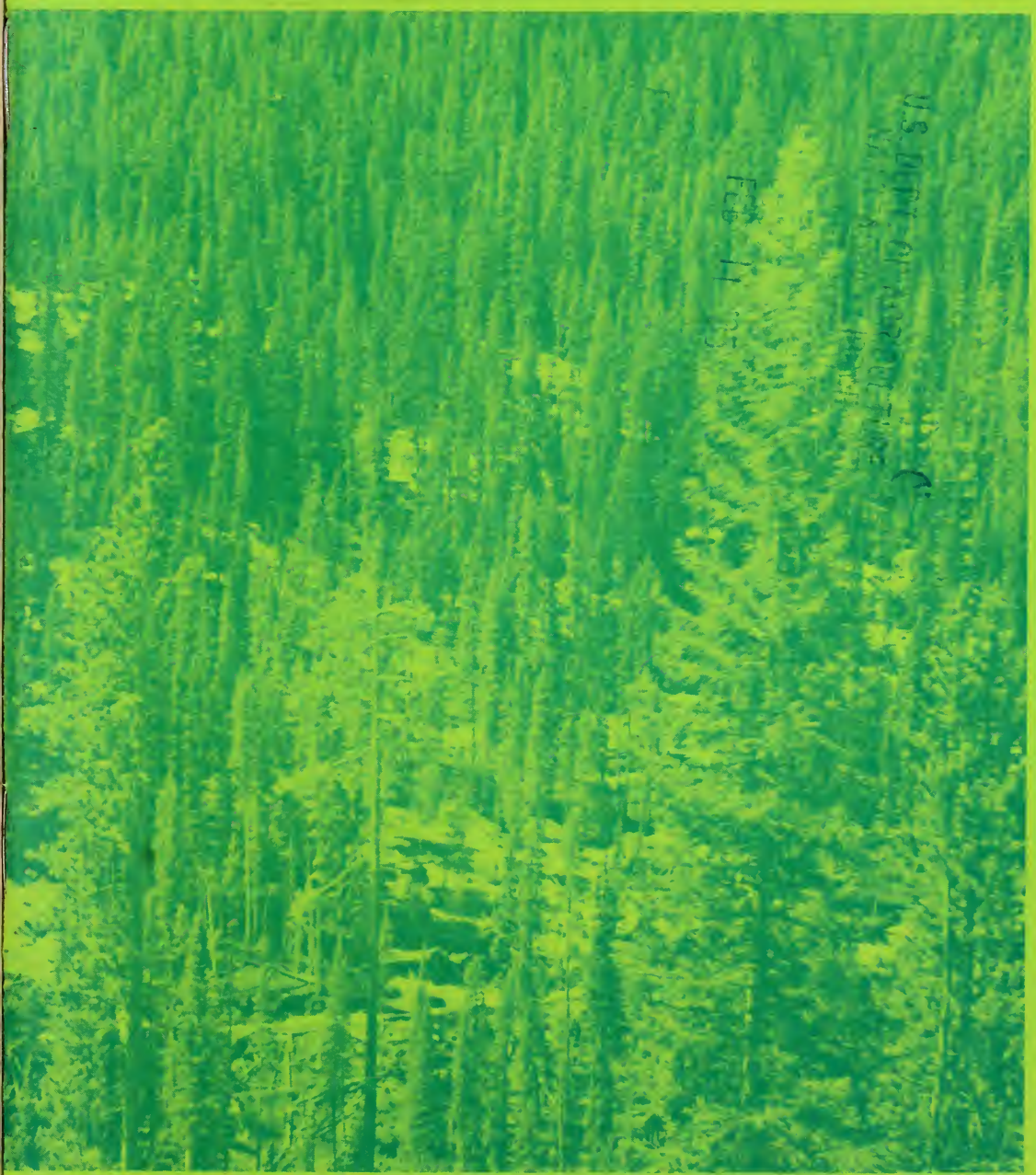
INITIAL PARTIAL CUTTING IN OLD-GROWTH SPRUCE-FIR:

a field guide

by Robert R. Alexander



INTRODUCTION

This field guide was prepared to aid the forest manager in identifying different stand conditions in old-growth spruce-fir, and developing partial cutting practices needed to preserve the forest landscape. Detailed information on stand characteristics, windfall and insect susceptibility and cutting practices needed to integrate timber production with other uses is given in USDA Forest Service Research Paper RM-76, "Initial Partial Cutting in Old-Growth Spruce-Fir."

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WINDFALL RISK

A. Below Average

1. Valley bottoms, except where parallel to the direction of prevailing winds, and flat areas.
2. All lower, and gentle middle north and east facing slopes.
3. All lower, and gentle middle, south and west facing slopes that are protected from the wind by considerably higher ground not far to windward.

B. Above Average

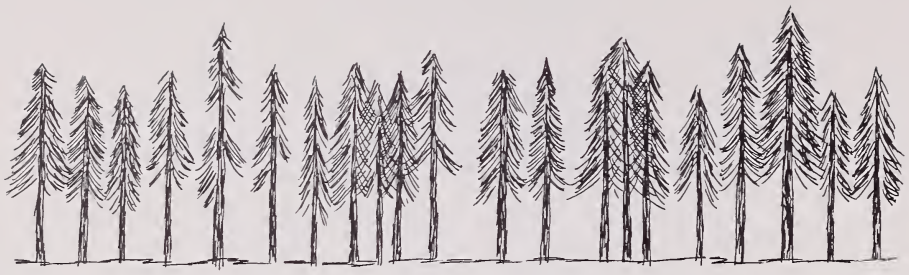
1. Valley bottoms parallel to the direction of prevailing winds.
2. Gentle middle south and west slopes not protected to the windward.
3. Moderate to steep middle, and all upper north and east facing slopes.
4. Moderate to steep middle, south and west facing slopes protected by considerably higher ground not far to windward.

C. Very High

1. Ridgetops.
2. Saddles in ridges.
3. Moderate to steep middle south and west facing slopes not protected to the windward.
4. All upper south and west facing slopes.

The risk of windfall in these situations is increased at least one category by such factors as poor drainage, shallow soils, defective roots and boles, and overly dense stands. Conversely the risk of windfall is reduced, if the stand is open-grown or composed of young, vigorous, sound trees. All situations become very high risk if exposed to special topographic situations such as gaps or saddles in ridges at higher elevations to the windward that can funnel winds into the area.

SINGLE - STORY



A. STAND DESCRIPTION

1. May appear to be even-aged, but usually contain more than one-age class. In some instances, the canopy may not appear to be of a uniform height because of changes in topography, stand density, or stocking.

2. Codominant trees form the general level of the overstory canopy. Dominants may be 5 to 10 feet taller and occasional superdominants may reach 15 to 20 feet above the general canopy level. Taller intermediates extend into the general canopy, shorter intermediates are below the general canopy level but do not form a second story.

3. Small range in diameters and crown lengths of dominants and codominants.

4. Few coarse limbed trees in the stand; if two-aged or more, younger trees usually have finer branches and may not have diameters equal to the older trees.

5. Trees more often uniformly spaced than clumpy.

6. Usually doesn't have a manageable stand of advanced reproduction.

B. SUGGESTED CUTTING PRACTICES

1. These stands are usually the least windfirm because the trees have developed together over a long period of time and mutually protect each other from the wind.

   a. If the windfall risk is below average, and the trees are uniformly spaced, the first cut should be light removing about 30 percent of the basal area of the stand on an individual tree basis. Since all overstory trees are about equally susceptible to windthrow, the general level of the canopy should be maintained by removing some trees from each overstory crown class. Avoid creating openings in the canopy with a diameter larger than one tree height by distributing the cut over the entire area.

   b. If the windfall risk is below average, and the trees are clumpy, the first cut should be a modified group selection that removes about 30 percent of the basal area. Harvesting timber in groups will take advantage of the natural arrangement of trees in clumps. Group openings should be kept small--not more than one to two tree heights in diameter--and not more than one-third of the area should be cutover. However, all trees in a clump should be either cut or left since they mutually support each other, and removing only part of a clump is likely to result in the loss of the remaining trees to windthrow.

   c. If the windfall risk is above average, and the trees are uniformly spaced, the first cut should be restricted to a very light intermediate cutting that removes about 10 percent of the basal area on an individual tree basis. The objective is to open up the stand just enough to allow the remaining trees to begin to develop windfirmness. This type of cutting resembles a sanitation cut in that the poorest risk trees (and superdominants) should be removed, but it is important that the general level of the overstory canopy be maintained intact. Provision should be made to salvage windfalls.

   d. If the windfall risk is above average, and the trees are clumpy, the first cut should be light, removing about 10 to 20 percent of the basal area in a modified group selection. Group openings should be no larger than one tree height in diameter, and not more than one-fifth of the area should be cut over at any one time. All trees in a clump should be cut or left. In stands with small natural openings--about one tree height in diameter--the openings can be enlarged one tree height by removing clumps of trees to the windward.

   e. If the windfall hazard is very high, or the stand is breaking up, the choice is usually limited to removing all the trees or leaving the area uncut.

TWO-STORY

A. STAND DESCRIPTION

1. May appear to be two-aged, but usually contains more than two-age classes.

2. Top story (dominants, codominants, and intermediates) is usually spruce; resembles a single-storied stand.

3. Second story is usually fir, younger trees of smaller diameter than the overstory. May consist of small sawlogs, poles, or large saplings, but is always below the top story and clearly distinguishable from the overstory. Trees in the second story are overtopped but not suppressed.

4. May contain a manageable stand of advanced reproduction.

5. Arrangement of individual trees varies from uniform to clumpy.

B. SUGGESTED CUTTING PRACTICES
(Two- and three-storied stands)

1. Trees in the overstory are usually more windfirm than those in single-storied stands dependent on each other for protection. The second and third stories are likely to be less windfirm than the top story.

   a. If the windfall risk is below average, and the trees are uniformly spaced, the first cut can remove up to 40 percent of the basal area. This type of cutting is heavy enough to resemble the first step of a two-cut shelterwood, but the marking follows the rules for individual tree selection--mature trees are removed from each story. Heavier cuts (60 percent or more of the basal area) may be possible in some instances, but the appearance of a continuous overstory canopy may not be retained. Since the overstory is likely to be more windfirm, selected dominants and codominants should be left. Avoid cutting holes larger in diameter than one tree height in the canopy by distributing the cut over the entire area.

   b. If the windfall risk is below average, and the trees are clumpy, the first cut should remove about 40 percent of the basal area in a modified group selection cutting. The group openings can be larger (two to three times tree height) than for single-storied stands, but the area cutover should be not more than one-third of the total. Furthermore, the group openings should be irregular in shape but without dangerous wind-catching indentations in the edges. All trees in a clump should either be cut or left.

   c. If the windfall risk is above average, and the trees are uniformly spaced, the first cut should be a light intermediate cutting that removes not more than 20 percent of the basal area, on an individual tree basis. Superdominants and codominants and intermediates with long, dense crowns should be removed first. Maintain the general level of the canopy. Provision should be made to salvage windfalls.

   d. If the windfall risk is above average, and the trees are clumpy, the first cut should be a modified group selection that removes 20 to 30 percent of the basal area. Group openings should be kept small--not more than one to two tree heights in diameter--and not more than one-fourth of the area should be cut over at any one time. All trees in a clump should either be cut or left. Small natural openings can be enlarged one to two tree heights by removing trees in clumps to the windward of the opening.

   e. If the windfall hazard is very high, or the overstory is breaking up, any partial cutting is a calculated risk.

THREE-STORY

A. STAND DESCRIPTION

1. May appear to be three aged, but usually contains more than three-age classes. Occasionally two-aged but is never all-aged.

2. If three-aged or more, top story usually predominantly spruce and resembles a single-storied stand except that there are fewer trees. Second and third stories consist of younger, smaller diameter trees (i.e. small sawlogs, poles and large saplings) that are usually fir. In a typical stand, the second story will be 10 to 30 feet below the top story and consist of small sawlogs or large poles. Third story will be 10 to 30 feet below the second story and consist of small poles or large saplings. Although the second and third stories are overtopped, the trees are not suppressed.

3. If two-aged, first two stories are old-growth with spruce in the top story and fir in the second story. The third story will be younger trees, largely fir, of smaller diameter.

4. Frequently contains a manageable stand of advanced reproduction.

5. More often clumpy than single- or two-storied stands.

B. SUGGESTED CUTTING PRACTICES
(Two- and three-storied stands)

1. Trees in the overstory are usually more windfirm than those in single-storied stands dependent on each other for protection. The second and third stories are likely to be less windfirm than the top story.

   a. If the windfall risk is below average, and the trees are uniformly spaced, the first cut can remove up to 40 percent of the basal area. This type of cutting is heavy enough to resemble the first step of a two-cut shelterwood, but the marking follows the rules for individual tree selection--mature trees are removed from each story. Heavier cuts (60 percent or more of the basal area) may be possible in some instances, but the appearance of a continuous overstory canopy may not be retained. Since the overstory is likely to be more windfirm, selected dominants and codominants should be left. Avoid cutting holes larger in diameter than one tree height in the canopy by distributing the cut over the entire area.

   b. If the windfall risk is below average, and the trees are clumpy, the first cut should remove about 40 percent of the basal area in a modified group selection cutting. The group openings can be larger (two to three times tree height) than for single-storied stands, but the area cutover should be not more than one-third of the total. Furthermore, the group openings should be irregular in shape but without dangerous wind-catching indentations in the edges. All trees in a clump should either be cut or left.

   c. If the windfall risk is above average, and the trees are uniformly spaced, the first cut should be a light intermediate cutting that removes not more than 20 percent of the basal area, on an individual tree basis. Superdominants and codominants and intermediates with long, dense crowns should be removed first. Maintain the general level of the canopy. Provision should be made to salvage windfalls.

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   e. If the windfall hazard is very high, or the overstory is breaking up, any partial cutting is a calculated risk.

MULTI - STORY

A. STAND DESCRIPTION

1. Generally broad-aged with a wide range in diameters.

2. If the stand developed from a relatively few individuals, overstory trees are coarse limbed, fill-in trees are finer limbed. Overstory trees may be relatively vigorous.

3. If the stand developed from the deterioration of a single- or two-storied stand, overstory may be no limbier than fill-in trees. Much of the vigorous growing stock is below sawlog size.

4. Almost always contains a manageable stand of reproduction as a ground story.

5. Fill-in trees may be clumpy, but usually not the overstory.

B. SUGGESTED CUTTING PRACTICES

1. These are usually the most windfirm, even where they have developed from the deterioration of single- and two-storied stands, because by the time they have reached their present condition, the remaining overstory trees are usually windfirm.

   a. If the windfall risk is below average, there is considerable flexibility in harvesting these stands. All size classes can be cut with emphasis on either the largest or smallest trees in the stand. For example, the first cut can range from removal of all large trees in the overstory to release the younger growing stock, to a thinning from below to improve the spacing of the larger trees. Thereafter, cutting can be directed toward uneven-aged management.

   b. If the windfall risk is above average or very high, the safest first cut is an overwood removal with a thinning from below to obtain a wide-spaced, open-grown stand that will develop windfirmness. Thereafter, cutting should be directed toward even-aged management.